Resonating Nitrous Oxide Thruster, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

AeroAstro proposes decomposing nitrous oxide (N2O) as an alternative propellant to existing spacecraft propellants. Decomposing N2O can be used as either a high Isp, hot-gas monopropellant or as a low Isp, cold gas for ACS thrusters. AeroAstro further proposes to use an innovative technique to achieve N2O decomposition: gasdynamic resonance. Gasdynamic resonance will elevate the N2O to the activation temperatures required for exothermic decomposition, allowing monopropellant operation without the difficulties of a catalyst. One of the challenges of long-duration space exploration systems is finding a propellant for microspacecraft that is safe, reliable, robust, and performs better than current propulsion systems. N2O can replace both hot-gas propellants such as hydrazine and cold-gas ACS systems such as nitrogen or isobutane. N2O is non-toxic, has a low freezing point (-91

o

C), and stores as a liquid. N2O is also a byproduct of the catalysis of ammonia, a main effluent of waste-water recycling systems for long-duration manned space missions. The anticipated results of this effort are data demonstrating the operating parameters of resonating N2O, and a dual-mode thruster design capable of both hot-gas and cold-gas operation. Phase II activity will evolve the design of the dual-mode thruster and demonstrate operation over a range of conditions.

Primary U.S. Work Locations and Key Partners

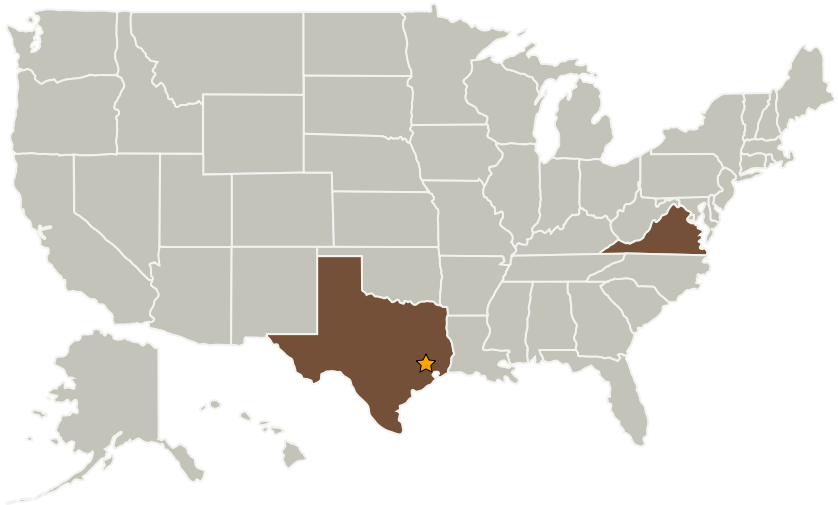

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
AeroAstro Corporation	Supporting Organization	Industry	Ashburn, Virginia

Primary U.S. Work Locations	
Texas	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.7 Cold Gas